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SUBJECT: U.S.-ROK PYROPROCESSING COOPERATION

Classified By: ISN Patricia A. McNerney, Reasons: 1.4 (b) and (d).

11. (C) Summary and Action Request: On October 20, 2008, the United States explained to the ROK its determination that the pyroprocessing process as contemplated by the ROK was reprocessing and proposed new parameters for U.S.-ROK bilateral cooperation in this area. Following discussion of the issue, the Korean side asked for a non-paper laying out the U.S. proposal. Embassy is requested to provide the non-paper contained in paragraph 7 to appropriate ROK officials in the Ministry of Education, Science and Technology (MEST) and the Ministry of Foreign Affairs and Trade (MOFAT), and to solicit an early ROK response to this non-paper. End Summary and Action Request.

12. (C) On October 20, 2008, ISN DAS Mary Alice Hayward met with MEST Director General of the Atomic Energy Bureau MOON Byung-Ryong to discuss the future direction of U.S.-ROK cooperation in pyroprocessing. DAS Hayward was accompanied by ISN/NESS Deputy Director Alex Burkart, DOE/NE Associate Deputy Assistant Secretary Carter Savage, NNSA/NA-24 Senior Advisor Mark Goodman and Idaho National Laboratory program manager Mike Simpson. MOON was accompanied by LEE Jang Keun, Director of the Disarmament Division, MOFAT; CHANG Soon-heung, Provost, Korea Advanced Institute of Science and Technology and Korean Atomic Energy Commission Member; KIM Dae-ki, Director, Nuclear Cooperation Division, MEST; and PARK Seung-won, Vice President, Korea Atomic Energy Research Institute (KAERI).

13. (C) Drawing on an interagency-cleared decision paper, DAS Hayward advised the ROK that, in contrast to earlier determinations in 2002 and 2006, the United States now considers the fuel cycle technology known as pyroprocessing to be reprocessing. This new determination, particularly in light of Korean plans for future development of this fuel cycle, led the United States to reconsider the nature and scope of its cooperation with the ROK in this area. DAS Hayward laid out the various factors considered, including policy with respect to enrichment and reprocessing technology transfer generally, potential impact on the Six-Party Talks process for denuclearization of the Korean Peninsula, and the closeness of the U.S.-ROK partnership, including extensive cooperation in nuclear research and development. She explained that, in light of those factors, the United States had decided to approve a limited program of cooperation in pyroprocessing technology, with the most sensitive activities occurring in the United States. This would be conditioned on the ROK: accepting limits on its in-country activities, supporting U.S. efforts in the Nuclear Suppliers Group to adopt a criteria-based approach to enrichment and reprocessing equipment and technology transfers and shelving its plans for new pyroprocessing facilities until the United States and Korea had jointly assessed the technical feasibility, economic viability and the nonproliferation acceptability of pyroprocessing. Following a discussion in which members of the Korean delegation sought to challenge and reverse the U.S. position, Director General Moon asked for the United States to provide a non-paper with its proposal for the ROK to study. DAS Hayward agreed.

14. (C) Subsequent to this meeting, CHANG pulled Burkart aside to further explore the U.S. position. In reiterating U.S. views, Burkart added that the United States fully understands Korean concerns about spent fuel management, particularly in light of its growing nuclear power program. He pointed out, however, that pyroprocessing was not a short-term solution to the problem. The only practical short-term measure was construction of additional interim storage facilities. This would give time for additional solutions to be explored, as the United States had suggested. The

two discussed the importance to the Korean Government of demonstrating to its public that, in pursuing cooperation between Korea and the United States, it was addressing the Korean spent fuel management problem and not just assisting in addressing the U.S. spent fuel management problem. In this regard, Chang agreed that it might prove useful for the Korean side to suggest activities, consistent with the U.S. proposal, for cooperation for the two sides to consider in order to enhance the public perception of the activity in Korea.

¶5. (C) On Tuesday, October 21, DAS Hayward, accompanied by Burkart met with KAERI President YANG Myung Seung to further discuss the U.S. proposal. YANG expressed the view that KAERI should be focusing on implementing its current research and development (R&D) plan that was aimed at demonstrating pyroprocessing technology. He also expressed disagreement with KAERI Vice President Park's focus on planning for future facilities. Yang seemed more than willing to consider the U.S. cooperation proposal if it helped him meet KAERI's current R&D goals. [Comment: In November 2007, Yang was promoted over Park's head to become President of KAERI. There appears to remain some willingness on Yang's part to tolerate Park's ambitions in order to avoid further antagonism. End Comment.] Yang seemed willing to consider the U.S. cooperation proposal.

¶6. (C) A Korean-speaking advisor to the U.S. delegation reported his impression of the reactions of KAERI staff and leadership to the U.S. position. First, KAERI's top priority was to begin "hot" work (i.e. experiments on U.S.-origin spent fuel) at the ACPF. While they professed disappointment with the U.S. decision to oppose "hot" electrowinning work at KAERI, overall they appeared pleased with the U.S. position. Second, KAERI staff misunderstood the U.S. position, believing that the United States had agreed to allow ACPF to begin hot experiments. They did not understand the nuance that the United States would initiate a decision process (by working on a joint determination of safeguardability) without prejudice to the outcome of that process.

¶7. (C/REL KOK) Begin Text of Nonpaper. The paper is "CONFIDENTIAL/Releasable to the Republic of Korea" in its entirety.

United States - Republic of Korea (ROK)
Pyroprocessing Cooperation

Background

In 2002, the United States approved a framework for cooperation with the Republic of Korea (ROK) in certain areas of pyroprocessing. The fact that pyroprocessing, as understood at the time, did not separate pure plutonium was a key factor in this approval, and the process was deemed not to be reprocessing. A continuation of the cooperation was approved in 2006, in the context of subsequent developments, including the Global Nuclear Energy Partnership (GNEP) and President Bush's 2004 initiative on restricting enrichment and reprocessing (ENR) transfers.

Approval of this cooperation was conditioned on the ROK's agreement that, until the United States determines otherwise, pyroprocessing activity conducted in the ROK would be limited to activities that do not involve the use of irradiated source material or any special nuclear material. It was further agreed that "hot" experiments, i.e., those involving irradiated nuclear material, would be conducted in the United States.

What Has Changed

Technical considerations and ROK plans have led the United States to reassess the 2002 and 2006 decisions. Recent advances in pyroprocessing technology have demonstrated improved methods that greatly reduce the quantity of fission products in the separated plutonium product. These advances have led the United States to conclude that the full pyroprocessing process should be considered reprocessing as it is conventionally understood: i.e., the separation of fissile material from fission products in irradiated nuclear fuel.

It is noteworthy that Korean plans have also changed. The Korean Atomic Energy Research Institute's (KAERI) interest in pyroprocessing has evolved from a focus on spent fuel conditioning (reduction in

volume and radioactivity) to development of the closed fuel cycle based on pyroprocessing, where spent light water reactor fuel would be reprocessed to separate out fission products for disposal and fissionable material for fabrication into fuel for use in fast reactors. This closed fuel cycle proposal, and the construction of facilities to support it, was presented most recently by MEST to the 29th meeting of the ROK-USA Joint Standing Committee on Nuclear Energy Cooperation, held in October, 2008. In this regard, KAERI has -- proposed new projects on technology development with Idaho National Laboratory; -- asked a U.S. firm, Gamma Engineering, to complete a cost analysis and conceptual design study for a proposed commercial-scale pyroprocessing plant to be located in the ROK; and -- informally asked for a Joint Determination of Safeguardability to permit "hot" experiments at its existing Advanced Spent Fuel Conditioning Process Facility (ACPF) using roughly 40 kg of spent fuel containing U.S.-obligated nuclear material, providing a draft program plan to cover this work.

Dealing with Changed Circumstances

The U.S. Government's reassessment of the 2002 and 2006 decisions considered, beyond technical factors, three additional political factors: impact on the Six-Party Talks; impact on U.S. policy on transfers of enrichment and reprocessing technology; and impact on U.S.-ROK bilateral relations and nuclear cooperation.

One concern is the extent to which any U.S. decision to proceed with pyroprocessing cooperation with the ROK would undermine certain agreed principles related to the goal of a denuclearized Korean Peninsula. Given the U.S. conclusion that the full pyroprocessing process as currently contemplated by the ROK constitutes reprocessing, there is the question of ROK commitments under the 1992 ROK-DPRK Joint Declaration on Denuclearization of the Korean Peninsula, which rules out possession of enrichment or reprocessing facilities in the North and the South (and which the September 2005 Six-Party Talks Joint Statement affirmed should be "observed and implemented"). Unlimited U.S.-ROK cooperation on advanced pyroprocessing research could also inadvertently encourage the DPRK to seek similar capabilities or provide it with a justification for restarting its now-disabled reprocessing plant.

The United States must also consider the impact of pyroprocessing cooperation with the ROK on its goal of restricting enrichment and reprocessing equipment and technology (ENR) transfers and gaining Nuclear Suppliers Group (NSG) agreement on a criteria-based approach to such restrictions. U.S. policy precludes any transfer of reprocessing equipment and technologies to any country not possessing a full-scale, functioning reprocessing plant. A criteria-based approach to the transfer of ENR, once adopted by the NSG, would govern future technology supply.

The United States strives to be a strong and reliable partner in cooperation with the ROK. The United States recognizes that the ROK is in a unique situation with the world's sixth-largest nuclear power program, with nuclear power providing nearly 40 percent of the ROK's electricity and a commitment to further enhancing the role of nuclear power as a clean source of power for its growing economy. The United States also recognizes the need for the ROK to manage the spent fuel arising from the generation of nuclear power. Cooperation between the United States and the ROK in this area goes back over 25 years and includes studies and technology development, including safeguards technology. The United States also recognizes the ROK as an important partner in international nuclear cooperation, including the Global Nuclear Energy Partnership (GNEP) framework. This partnership benefits from Korean experience in infrastructure development, spent fuel and waste management, grid appropriate reactor design, fuel cycle technology development and implementation and safeguards technology development. U.S.-ROK cooperation also promises to make an important contribution to the pursuit of fuel cycle technology development under GNEP.

Proposal for Future Cooperation

The United States has considered whether it should terminate pyroprocessing cooperation or whether it can fully cooperate in future development of a pyroprocessing-based closed fuel cycle in the ROK. In light of the factors cited above, neither approach is

viable. Instead, the United States proposes to continue cooperation on research and development, building on commitments made in 2002. The purpose of this cooperation would be to reach a joint conclusion in future years as to the viability of pyroprocessing on technical, economic, and nonproliferation grounds.

The ROK should be aware that its engagement in pyroprocessing cooperation with a third party without the involvement of the United States could trigger sanctions under various provisions of U.S. law on both the ROK and the cooperating partner, requiring the termination of significant U.S. nuclear cooperation with the ROK and its partner, unless waived by the President.

The following are the major elements of the U.S. proposal:

1. The United States would agree to continued cooperation in research and development of pyroprocessing technology in order to determine jointly with the ROK whether pyroprocessing is feasible on a technical and economic basis and acceptable on nonproliferation grounds.

2. The ROK would agree to shelve indefinitely plans for constructing any future domestic facilities for "hot" pyroprocessing work, beyond the ACPF, at least until the technical and economic feasibility and nonproliferation acceptability have been determined jointly by the United States and the ROK.

3. The United States and the ROK would agree on the desirability of having any future plant that included capabilities beyond electroreduction, if jointly deemed viable, located outside of the ROK at a mutually acceptable location, perhaps as a multinational, GNEP-related demonstration project, with the ROK as a major partner. The two sides would agree to study this concept as part of their pyroprocessing cooperation.

4. The United States would agree, contingent on the NSG reaching agreement on a criteria-based approach for ENR transfers, and subject to applicable U.S. laws and regulations, to share pyroprocessing technology.

5. The ROK would support the U.S. proposal in the NSG for a criteria-based approach for ENR transfers.

6. The United States would agree that pyroprocessing technology transfers could, subject to applicable U.S. laws and regulations, include technology that is deemed "sensitive nuclear technology" (SNT) under U.S. law and regulations, and therefore subject to U.S. legal controls on use and retransfer (under sections 127 and 128 of the Atomic Energy Act).

7. The ROK would agree to accept required SNT controls on U.S.-shared technology. This agreement would be contained in a bilateral agreement meeting the requirements of U.S. law. These include the requirement for U.S. consent rights over retransfer of any SNT exported from the United States, and the requirement that the nuclear material and equipment produced or constructed through the use of U.S.-origin SNT must be subjected to the same conditions under section 127 of the Atomic Energy Act (relating to IAEA safeguards, peaceful uses, adequate physical security, retransfer and alteration in form or content) including U.S. consent rights, as would apply to exports of U.S.-origin nuclear material and equipment. The language of the current U.S.-ROK nuclear cooperation agreement does not cover transfers of SNT or material or equipment produced through the use of SNT. Separate government-to-government assurances would therefore be required.

8. The two sides would agree that all Korean work involving electrorefining and downstream activities that use spent fuel or other special nuclear material would take place jointly in the United States or in a mutually agreed upon third country. Work with simulated materials (not involving spent fuel or other special nuclear material) could continue in the ROK.

9. The two sides would agree to limit cooperation in electrorefining technology to development of processes producing a relatively impure plutonium-bearing product (e.g., those using liquid cadmium cathodes), unless the sides jointly decide otherwise, for example, in the context of agreement on development of a multinational

pyroprocessing plant located outside the ROK as an alternative to a plant located within the ROK.

¶10. The United States would approve, contingent on the NSG reaching agreement on ENR criteria and subject to applicable U.S. laws and regulations, the KAERI-INL CRADA involving collaborative work with small amounts of nuclear materials in the United States.

¶11. During the intervening period, the United States could approve, on a case-by-case basis, work that does not involve transfer of SNT. Within that constraint, the United States would approve, subject to applicable U.S. laws and regulations, the Gamma Engineering request to conduct a conceptual design and economic analysis of a generic future large-scale pyroprocessing facility in an unspecified location.

¶12. To enable an early decision on whether to authorize the ACPF to begin processing spent fuel containing U.S.-origin nuclear material, and without prejudice to the outcome of that decision, the United States and the ROK would agree to begin jointly the necessary processes under the U.S.-ROK nuclear cooperation agreement and under U.S. law and in accordance with an agreed program plan for the ACPF.

¶13. In order to develop such a program plan, the plan included in Draft/KAERI/AR-790-rev2/2008 would be amended in an appropriate manner to include reference to work by the ROK and the United States to develop a conceptual approach for the role of ACPF and potential future commercial-scale electroreduction facilities in future ROK and international spent fuel management activities, addressing, for example:

- the use of electroreduction as a spent fuel conditioning process, including interim storage and eventual geological disposal;
- the use of electroreduction as a freestanding front-end process, to produce from spent fuel a material form for transport to a pyroprocessing facility outside the ROK for further separation and fabrication into reactor fuel;
- the role of ACPF as an element of international collaborative R&D effort on pyroprocessing;
- assessments of economic viability as well as safety, security, safeguards and proliferation risks associated with each of these uses, and
- continued collaboration on safeguards technologies and approaches for pyroprocessing facilities.

¶14. The ROK would agree not to construct any follow-on facility to the ACPF until completion of the conceptual approach referred to above.

¶15. The ROK would agree not to introduce electrowinning, electrowinning or similar separations capabilities into the ACPF or any follow-on facility.

¶16. The two sides would agree, in accordance with their domestic laws and procedures, to incorporate this proposal at an early date into a bilateral agreement, perhaps through a Confidential Minute or as a Confidential Annex to the agreement on SNT transfer referred to above.

The United States believes that this proposal is an excellent basis for future cooperation. While requiring the ROK to curtail some of its planned domestic activities, the proposal also anticipates collaboration in those areas through unprecedented sharing of Sensitive Nuclear Technology and conclusion of a government-to-government agreement covering SNT transfers.

The United States also considers this proposal to be a package and cannot agree to pieces of the package separately. However, the United States recognizes the strong domestic requirement for the ROK to be seen as undertaking actions that address its own spent fuel management issues, and would be willing to consider additional activities that could be carried out in the context of and not in contradiction to the terms of this proposal.

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